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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/560,131

05/12/2006

Hiroyuki Ochiai

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12/20/2010

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ALEXANDRIA, VA 22314

EXAMINER

WAITS, ALAN B

ART UNIT

PAPER NUMBER

3656

NOTIFICATION DATE

DELIVERY MODE

12/20/2010

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/560,131	<b>Applicant(s)</b> OCHIAI ET AL.	
	<b>Examiner</b> ALAN B. WAITS	<b>Art Unit</b> 3656	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 October 2010.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 21,23-26,28-33 and 45-47 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 21,23-26,28-33 and 45-47 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 December 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 21, 23-26, 28-31, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh USP 5190450 in view of Yamamoto USP 6874942.

Ghosh discloses a similar device comprising:

#### **Re clm 21**

- Engaging portions (22, fig 3) formed on a cylindrical side surface around a circumference of the rotation member (22 and 14, fig 3)
- The engaging portions being rotatably supported by the housing and rotating relative to the housing
- A coating (col 4, ln 7-13) covering the engaging portions and including a mixture of one or more wear-resistant materials selected from the group consisting of Si, cubic BN, TiC, WC, SiC, Cr<sub>3</sub>C<sub>2</sub>, ZrO<sub>2</sub>-Y and TiB

#### **Re clm 26**

- The rotation member (shaft 22, fig 3)
- A supporting portion (plain bearing means, claim 1) configured to rotatably support the rotation member
- The rotation member rotating relative to the housing

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- A coating covering (claim 2) a bearing of the supporting portion into which the rotation member is inserted
- The coating including a mixture of one or more wear-resistant materials selected from the group consisting of Si, cubic BN, TiC, WC, SiC,  $\text{Cr}_3\text{C}_2$ ,  $\text{ZrO}_2\text{-Y}$  and TiB

**Re clm 21 and 26**, the following limitations are product-by-process limitations:

- The coating being deposited from a tool electrode including the wear-resistant materials and the solid lubricant by processing the engaging portion as a workpiece with electric spark machining

Ghosh does not disclose:

**Re clm 21, 23, 26 and 28**

- The coating includes one or more solid lubricants selected from the group consisting of hexagonal BN,  $\text{Cr}_2\text{O}_3$ ,  $\text{WS}_2$ , and  $\text{BaZrO}_4$

Yamamoto teaches a hard coating layer comprising one or more of:

- TiC, Cr, WC, cubic BN, and  $\text{Cr}_2\text{O}_3$

Since both Ghosh and Yamamoto teach a hard coating layer comprising WC, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the WC of Ghosh with any combination of the equivalents taught by Yamamoto such as:

- TiC, Cr, WC, cubic BN, and  $\text{Cr}_2\text{O}_3$

to achieve the predictable result of providing the shaft with a hard coating layer for improved wear resistance.

**Re clm 24**

- The electric spark machining is carried out with rotating the rotation member (product-by-process)

The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

**Re clm 25**

- grooves (30, fig 5 and 6) configured to pool a lubrication liquid are formed concentrically around the engaging portions

**Re clm 30**

- A gear box comprising the housing of claim 21

**Re clm 29**

- The bearing includes a groove (30, fig 5 and 6)

**Re clm 31**

- A gear box comprising the housing of claim 26

**Re clm 46**

- The engaging portions are respectively formed on longitudinal ends of the rotation member (20s, fig 3)

**Re clm 47**

- The supporting portion is configured to rotatably support each longitudinal end of the rotation member

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3. Claims 26 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii USP 5660480 in view of Yamamoto USP 6874942.

Fujii discloses a similar device comprising:

**Re clm 26**

- The rotation member (shaft 1, fig 1)
- A supporting portion (bearing surface: col 7, ln 28-35) configured to rotatably support the rotation member
- The rotation member rotating relative to the housing
- A coating covering (layer of solid lubricant or material of excellent wear resistance, col 7, ln 32-33) a bearing of the supporting portion into which the rotation member is inserted
- The coating including one or more wear-resistant materials selected from the group consisting of Si, cubic BN, TiC, WC, SiC,  $\text{Cr}_3\text{C}_2$ ,  $\text{Zr}_2\text{-Y}$  and TiB

The following limitation is a product-by-process limitation:

- The coating being deposited from a tool electrode including the wear-resistant materials by processing the engaging portion as a workpiece with electric spark machining

Fujii does not disclose:

**Re clm 26 and 28**

- The coating includes one or more solid lubricants selected from the group consisting of hexagonal BN,  $\text{Cr}_2\text{O}_3$ ,  $\text{WS}_2$ , and  $\text{BaZrO}_4$ .

Yamamoto teaches a hard coating layer comprising one or more of the following:

- TiC, WC, cBN, and Cr<sub>2</sub>O<sub>3</sub>

Since both Fujii and Yamamoto teach hardening layers comprising TiC, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the equivalents taught by Yamamoto, such as:

- TiC, WC, cBN, and Cr<sub>2</sub>O<sub>3</sub>

to achieve the predictable result of providing the bearing with improved wear resistance.

4. Claim 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ghosh USP 5190450 in view of Yamamoto USP 6874942 as applied to claim 21 and 26 above, and further in view of Bishop USP 6139261.

Ghosh in view of Yamamoto discloses all the claimed subject matter as described above.

#### **Re clm 32 and 33**

Ghosh in view of Yamamoto does not disclose:

- A shaft structure of variable vanes for regulating a fluid, comprising the rotation member/housing of claim 21/26

Bishop discloses a shaft structure of variable vanes for regulating a fluid, comprising a rotation member/housing (fig 3).

Since both Ghosh and Bishop teach shaft and bearing assemblies, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the hard coating of Ghosh into the device of Bishop and provide:

- A shaft structure of variable vanes for regulating a fluid, comprising the rotation member/housing of claim 21/26

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to achieve the predictable result of improving the wear resistance of the bearing and prolonging the life of the device.

5. Claims 33, 45 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujii USP 5660480 in view of Yamamoto USP 6874942 as applied to claim 26 above, and further in view of Bishop USP 6139261.

Fujii in view of Yamamoto discloses all the claimed subject matter as described above.

Fujii in view of Yamamoto does not disclose:

**Re clm 33**

- Shaft structure of variable vanes for regulating a fluid, comprising the housing of claim 26

Bishop discloses a shaft structure of variable vanes for regulating a fluid, comprising a housing (fig 3).

Since both Fujii and Bishop teach shaft and bearing assemblies, it would have been obvious to one of ordinary skill in the art at the time of the invention to substitute the hard coating of Fujii in view of Yamamoto into the device of Bishop and provide:

- A shaft structure of variable vanes for regulating a fluid, comprising the rotation member/housing of claim 21/26

to achieve the predictable result of improving the wear resistance of the bearing and prolonging the life of the device.

**Re clm 45**, Bishop's variable vane structure further comprises:



- A bush (26, fig 3) disposed in the supporting portion and surrounding each of the engaging portions
- The bush being formed of a different material than a remainder of the housing (col 2, ln 52-55)

**Re clm 47**, Bishop's variable vane structure further comprises:

- The supporting portion is configured to rotatably support each longitudinal end of the rotation member

### ***Response to Arguments***

6. Applicant's arguments filed 10/21/2010 have been fully considered but they are not persuasive.

Applicant argues that Yamamoto describes in col 7, ln 28-35 a coated layer of solid lubricant such as fluoroplastics, hexagonal boron nitride, or a material of excellent wear resistance such as TiC. The examiner points out that Yamamoto discloses none of these things in col 7.

Applicant argues that Yamamoto does not disclose "a mixture of one or more wear-resistant materials...and one or more solid lubricants". The examiner points out that Yamamoto **explicitly** states "The hard coating layer comprises at least one material of ...TiC...,Cr<sub>2</sub>O<sub>3</sub>...,WC..., and cBN" in col 18, ln 28-30. Cr<sub>2</sub>O<sub>3</sub> is the solid lubricant as defined by Applicant and TiC, WC, and cBN are wear-resistant materials. The phrase "at least one material of" means that combinations are included. Thus, Yamamoto discloses Applicant's novel feature of a solid lubricant with a wear-resistant material.

Applicant further argues that a person of ordinary skill in the art would recognize that these methods only enable formation of a coating of a pure substance, not a mixture of materials. The examiner disagrees. Col 18, ln 37-41 states "various methods can be used, for example various CVD methods such as Plasma CVD, thermal CVD or optical CVD, ion plating method..and ionizing vapor deposition method".

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALAN B. WAITS whose telephone number is (571)270-3664. The examiner can normally be reached on Monday through Friday 7:30 am to 5 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Ridley can be reached on 571-272-6917. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Alan B Waits/  
Examiner, Art Unit 3656

/Richard WL Ridley/  
Supervisory Patent Examiner, Art Unit 3656